

REMARKS/ARGUMENTS

Applicants respectfully request reconsideration of this application in view of the foregoing amendments to the claims and the following comments.

In the Office Action mailed December 13, 2006, claims 1, 3-24, 26 and 27 were examined. Claims 1, 4, 26 and 27 were rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 3,612,282 to Cheng et al. (the “Cheng patent”), and claims 3, 21 and 23 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over the Cheng patent in view of U.S. Patent No. 5,104,535 to Cote et al. (the “Cote patent”). Applicants note with appreciation the indicated *allowability* of claims 5-11, 22 and 24, if rewritten in independent form, and the indicated *allowance* of claims 12-20.

Applicants respectfully traverse the rejections of claims 1, 3, 4, 21, 23, 26, and 27. As discussed below, Applicants suspect that the Examiner might have overlooked one or more features recited in the rejected claims.

The Invention

Before addressing the rejections of claims, it will be helpful first to briefly summarize Applicants’ invention. As recited in independent claim 1, the invention is embodied in an apparatus for modifying the concentration of a predetermined substance present in a first fluid flowing through a conduit. The apparatus is defined to include first and second pluralities of hollow fiber membrane modules, each module including, among other things, a plurality of elongated hollow fiber membranes having cylindrical walls configured to transmit the predetermined substance therethrough.

The hollow fiber membrane modules of the first plurality of modules are located within the conduit and mated with each other, in alignment along the conduit’s longitudinal axis. Similarly, the hollow fiber membrane modules of the second first plurality of modules, likewise, are located within the conduit and mated with each other, in alignment along the conduit’s longitudinal axis and downstream of the first plurality of modules. A baffle assembly is located within the conduit and configured to direct the flow of the first fluid initially to the first plurality of hollow fiber membrane modules and thereafter to the second plurality of hollow fiber

membrane modules. In each case, the fluid flows through the module along a transverse flow path past the exterior surfaces of the elongated hollow fiber membranes.

The apparatus further is defined to include a fluid source that delivers a second fluid to the plurality of elongated hollow fiber membranes of each of the membrane modules and that directs this second fluid to flow through each hollow fiber membrane, from one of its ends to the other.

Thus, the first fluid is made to flow through the conduit, flowing first past the exterior surfaces of the hollow fiber membranes of the first plurality of membrane modules and then past the exterior surfaces of the membranes of the second plurality of membrane modules. Simultaneously, the second fluid is made to flow through the plurality of hollow fiber membranes of all of the modules, from one end to other of each membrane. During the course of this simultaneous flow of the first and second fluids, a predetermined substance is transmitted through the walls of the hollow fiber membranes, to modify the concentration of the predetermined substance in the first fluid.

**The Rejection of Claims 1, 4, 26 and 27 Under
35 U.S.C. § 102(b) Based on the Cheng Patent**

As mentioned above, independent claim 1 and its dependent claims 4, 26 and 27 were rejected under 35 U.S.C. § 102(b), as allegedly anticipated by the Cheng patent. In rejecting independent claim 1, the Examiner asserted as follows, at page 2 of the Office Action:

Cheng et al disclose apparatus comprising the 1st plurality of hollow fiber membranes 19d, module housing to support, conduit 17 and see column 5, lines 43-53, 2nd plurality of membranes 19c, and a baffle assembly including flow directing members 25, 26, 27 and 28 directing flow sequentially to the 1st and 2nd groups of membranes comprising [sic] and fluid source (figure 4, column 4, line 74—column 5, line 41 and column 5, line 10).

This mischaracterizes the disclosure of the Cheng patent. The Cheng patent discloses several embodiments of a reverse osmosis/filter apparatus for producing fresh water from brine or the like. The referenced embodiment of Fig. 4 includes a pressure vessel 17 with several membrane tube assemblies 19a-d located within separate conduits 18a-d and with

channels 25-29 interconnecting the conduits 18a-d such that pressurized brine is directed sequentially past the exterior surfaces of the hollow tube membranes of the membrane tube assemblies 19a-d. Fresh water permeates through these membranes into the membrane interiors, for discharge from the apparatus via headers 30a-d.

Significantly, Cheng's apparatus lacks a fluid source that delivers a second fluid to the membrane tube assemblies 19a-d and that directs the second fluid to flow through the elongated hollow fiber membranes of each assembly. Indeed, all of such hollow fiber membranes are open at only one of their ends; the other ends are closed. This is clearly depicted in Fig. 4 of the Cheng patent.

The presence of such a fluid source for the second fluid is one feature that distinguishes the apparatus of independent claim 1 from the disclosure of the Cheng patent. To clarify this distinction, Applicants have by this Amendment amended claim 1 to specify not just that the "fluid source" element "directs" the second fluid source to flow through the hollow fiber membranes, but also that it "delivers" the second fluid to those membranes. This amendment should clarify what had been the original, intended meaning of this element of claim 1.

For this reason alone, the Cheng patent fails to anticipate independent claim 1. The § 102(b) rejection of independent claim 1, therefore, is improper and should be withdrawn.

Claims 3, 26 and 27 all depend from independent claim 1, adding structural features that further distinguish over the cited Cheng patent. For this reason, and for the reasons set forth above with respect to claim 1, the § 102(b) rejection of claims 3, 26 and 27 is improper and should be withdrawn.

The Rejection of Claims 3, 21 and 23 Under 35 U.S.C. § 103(a)
Based on the Cheng Patent and the Cote Patent

As mentioned above, claims 3, 21 and 23 were rejected under 35 U.S.C. § 103(a), as allegedly obvious over the Cheng patent in view of the Cote patent. Claim 3 depends from independent claim 1, claim 21 is independent, and claim 23 depends from claim 21.

In rejecting dependent claim 3, the Examiner asserted as follows, at page 4 of the Office Action:

Claim 3 differs in requiring polymeric membrane material, as taught by Cote et al at column 10, lines 10-22. It would have been obvious to one or [sic] ordinary skill in the art at the time of the invention to have utilized the membrane material of Cote et al. in the apparatus of Cheng, since such membrane material forms hollow fiber bundles having a long-lasting and fluid-tight bond and hence imparts durability.

It appears from these comments that the Examiner has cited the Cote patent solely for its disclosure of various materials as suitable for use as the hollow fiber membrane material. Applicants note that the identified materials listed at column 10, lines 10-22, of the Cote patent do not correspond to any of the materials listed in claim 3, i.e., "polypropylene, polyvinylidene fluoride, and Teflon®." (Teflon is a trademark for the generic material polytetrafluoroethylene). Regardless, Applicants do not assert that they are the first persons to use such materials in a hollow fiber membrane module.

Applicants note that the Cote patent fails to make up for the deficiencies of the Cheng patent. The Examiner has failed to present any argument as to why the Cote patent would have suggested to those skilled in the art to have modified Cheng's reverse osmosis/filter apparatus so that a second fluid is delivered to Cheng's membrane tubes and directed to flow through those tubes while a first fluid flows past the tubes' exterior surfaces. For this reason, the § 103(a) rejection of dependent claim 3 is improper and should be withdrawn.

In rejecting independent claim 21 and its dependent claim 23, the Examiner asserted as follows, at page 4 of the Office Action:

Claims 21 and 23 differ in requiring the hollow fiber membrane module to be configured to be positionable within a conduit and mateable with a similar module. Cote et al teach such mating of modules in and positionable in a conduit (see figures 1 and 5 and column 6, lines 17-26 concerning stacking, figure 5 illustrating mating modules in a common conduit). It would have been obvious to one or [sic] ordinary skill in the art at the time of the invention to have utilized the configurable mating of membrane modules of Cote et al in the apparatus of Cheng, so as to filter and treat a larger flow volume of fluid.

It appears from these comments that the Examiner has cited the Cote patent solely for its alleged disclosure of mating, stackable modules within a conduit. But the Examiner has ignored important features recited in claims 21 and 23.

For example, independent claim 21 defines the apparatus to include first, second and third flow diversion assemblies located in specific positions relative to the first and second stages of membrane modules. Although the apparatus of the Cote patent does incorporate structure for directing fluid flow, that structure does not correspond to the specified flow diversion assemblies and their specified locations and functions.

For further example, independent claim 21 defines the apparatus to include a fluid source that delivers a second fluid to the hollow fiber membranes and that directs the fluid to flow through those membranes. This element corresponds to the element discussed above in connection with independent claim 1. The Examiner has failed to present any argument as to how the Cote patent would have suggested to those skilled in the art to have modified Cheng's reverse osmosis/filter apparatus so that a second fluid is delivered to Cheng's membrane tubes and directed to flow through those tubes while a first fluid flows past the tubes' exterior surfaces.

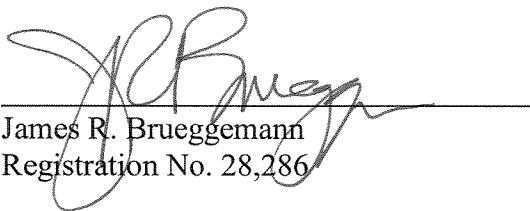
For these reasons, the § 103(a) rejection of independent claim 21 and its dependent claim 23 is improper and should be withdrawn.

Conclusion

This application should now be in condition for a favorable action. Issuance of a notice of allowance is respectfully requested. If the Examiner believes that a telephone conference with Applicants' undersigned attorney of record might expedite the prosecution of this application, he is invited to call at the telephone number indicated below.

Respectfully submitted,

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